



## **The Trends of Soil Temperature Change Associated with Air Temperature Change in Korea from 1973 to 2012**

Bo-Hyun Lee, Byeong-Hak Park, Eun-Hee Koh, and Kang-Kun Lee

School of Earth and Environmental Sciences, Seoul National University, Seoul, Korea, Republic Of (pret5787@snu.ac.kr)

Examining long-term trends of the soil temperature can contribute to assessing subsurface thermal environment. The recent 40-year (1973-2012) meteorological data from 14 Korea Meteorological Administration (KMA) stations was analyzed in this study to estimate the temporal variations of air and soil temperatures (at depths 0.5 and 1.0m) in Korea and their relations. The information on regional characteristics of study sites was also collected to investigate the local and regional features influencing the soil temperature. The long-term increasing trends of both air and soil temperatures were estimated by using simple linear regression analysis. The air temperature rise and soil temperature rise were compared for every site to reveal the relation between air and soil temperature changes. In most sites, the proportion of soil temperature rise to air temperature rise was nearly one to one except a few sites. The difference between the air and soil temperature trends at those sites may be attributed to the combined effect of soil properties such as thermal diffusivity and soil moisture content. The impact of urbanization on the air and soil temperature was also investigated in this study. Establishment of the relationship between the air and soil temperatures can help predicting the soil temperature change in a region where no soil temperature data is obtained by using air temperature data. For rigorous establishment of the relationship between soil and air temperatures, more thorough investigation on the soil thermal properties is necessary through additional monitoring and accompanied validation of the proposed relations.

**Keywords :** Soil temperature, Air temperature, Cross-correlation analysis, Soil thermal diffusivity, Urbanization effect

### **Acknowledgement**

This work was supported by the research project of “Advanced Technology for Groundwater Development and Application in Riversides (Geowater+)” in “Water Resources Management Program (code 11 Technology Innovation C05)” of the MOLIT and the KAIA in Korea.